

FORM PTO-1449 (Modified)			J.S. Department of Commerce Patent and Trademark Office		Attorney Docket No. JL-01301		Serial No.: 10/680,584	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use Several Sheets If Necessary) (37 CFR § 1.98(b))			Applicants: Thomas W. Kenny et al.					
			Filing Date: October 6, 2003		Group Art Unit: 3753			
FOREIGN PATENTS OR PUBLISHED FOREIGN PATENT APPLICATIONS								
		Document Number	Publication Date	Country / Patent Office	Class	Subclass	Translation	
	AA	97212126.9	03/04/97	CN	BO1D	61/42	Yes	No
	AB	2000-277540	10/06/00	JP	H01L	21/50		X
OTHER DOCUMENTS (Including Author, Title, Date, Relevant Pages, Place of Publication)								
<i>01 PE</i>								
	AC	Stephen C. Jacobson et al., "Fused Quartz Substrates for Microchip Electrophoresis", Analytical Chemistry, Vo. 67, No. 13, July 1, 1995, pages 2059-2063.						
<i>MAR 18 2005</i>								
	AD	Kendra V. Sharp et al., "Liquid Flows in Microchannels", 2002, Vol. 6, pages 6-1 to 6-38.						
	AE	Shuchi Shoji et al., "Microflow devices and systems", J. Microech. Microeng. 4 (1994), pages 157-171, printed in the U.K.						
	AF	Angela Rasmussen et al., "Fabrication Techniques to Realize CMOS-Compatible Microfluidic Microchannels", Journal of Microelectromechanical, Vo. 10, No. 2, June 2001, pages 286-297.						
	AG	J. H. Wang et al., "Thermal-Hydraulic Characteristic of Micro Heat Exchangers", 1991, DSC-Vol. 32, Micromechanical Sensors, Actuators, and Systems, pages 331-339.						
	AH	Gad Hetsroni et al., "Nonuniform Temperature Distribution in Electronic Devices Cooled by Flow in Parallel Microchannels", IEEE Transactions on Components and Packaging Technologies, March 2001, Vol. 24, No. 1, pages 16-23.						
	AI	X. F. Peng et al., "Heat Transfer Characteristics of Water Flowing through Microchannels", Experimental Heat Transfer An International Journal, Vol. 7, No. 4, October-December 1994, pages 265-283.						
	AJ	Linan Jiang et al., "Forced Convection Boiling in a Microchannel Heat Sink", Journal of Microelectromechanical Systems, Vol. 10, No. 1, March 2001, pages 80-87.						
	AK	Muhammad M. Rahman et al., "Experimental Measurements of Fluid Flow and Heat Transfer in Microchannel Cooling Passages in a Chip Substrate", 1993, EEP-Vol. 4.2, Advances in Electronic Packages, pages 685-692.						
	AL	X. F. Peng et al., "Forced convection and flow boiling heat transfer for liquid flowing through Microchannels", 1993, Int. J. Heat Mass Transfer, Vol. 36, NO. 14, pages 3421-3427.						
	AM	Lung-Jieh Yang et al., "A Micro Fluidic System of Micro Channels with On-Site Sensors by Silicon Bulk Micromaching", September 1999, Microfluidic Devices and Systems II, Vol. 3877, pages 267-272.						
	AN	G. Mohiuddin Mala et al., "Heat transfer and fluid flow in microchannels", 1997, Int. J. Mass transfer, Vol. 40, No. 13, pages 3079-3088, printed in Great Britain.						
	AO	J. M. Cuta et al., "Fabrication and Testing of Micro-Channel Heat Exchangers", SPIE Microlithography and Metrology in Micromaching, Vol. 2640, 1995, pages 152-160.						
	AP	Linan Jiang et al., "A Micro-Channel Heat Sink with Integrated Temperature Sensors for Phase Transition Study", 1999, 12 th IEEE International Conference on Micro Electro Mechanical Systems, pages 159-164.						
	AQ	Linan Jiang et al., "Fabrication and characterization of a microsystem for a micro-scale heat transfer study", J. Micromech. Microeng. 9 (1999) pages 422-428, printed in the U.K.						
	AR	M. B. Bowers et al., "High flux boiling in low flow rate, low pressure drop mini-channel and micro-channel heat sinks", 1994, Int. J. Heat Mass Transfer, Vol. 37, No. 2, pages 321-332.						
	AS	Yongendra Joshi, "Heat out of small packages", December 2001, Mechanical Engineer, pages 56-58.						
	AT	A. Rostami et al., "Liquid Flow and Heat Transfer in Microchannels: a Review", 2000, Heat and Technology, Vol. 18, No. 2, pages 59-68.						
	AU	Lian Zhang et al., "Measurements and Modeling of Two-Phase Flow in Microchannels with Nearly Constant Heat Flux Boundary Conditions", Journal of Microelectromechanical Systems, Vol.11, No. 1, February 2002, pages12-19.						
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	AW	Issam Mudawar et al., "Enhancement of Critical Heat Flux from High Power Microelectronic Heat Sources in a Flow Channel", Journal of Electronic Packaging, September 1990, Vol. 112, pages 241-248.						
	AX	Nelson Kuan, "Experimental Evaluation of Micro Heat Exchangers Fabricated in Silicon", 1996, HTD-Vol. 331, National Heat Transfer Conference, Vol. 9, pages 131-136.						
	AY	E. W. Kreutz et al., "Simulation of micro-channel heat sinks for optoelectronic microsystems", Microelectronics Journal 31(2000) pages 787-790.						
	AZ	I.C. M. Koh et al., "Heat Transfer of Microstructure for Integrated Circuits", 1986, Int. Comm. Heat Mass Transfer, Vol. 13, pages 89-98.						
	BA	Sezana Konecni et al., "Convection Cooling of Microelectronic Chips", 1992, InterSociety Conference on Thermal Phenomena, pages 138-144.						
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OTHER DOCUMENTS (Including Author, Title, Date, Relevant Pages, Place of Publication)

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	BC	Jerry K. Keska Ph. D. et al., "An Experimental Study on an Enhanced Microchannel Heat Sink for Microelectronics Applications", EEP-Vol. 26-2, Advances in Electronic Packaging, 1999, Vol. 2, pages 1235-1259.
	BD	Shung-Wen Kang et al., "The Performance Test and Analysis of Silicon-Based Microchannel Heat Sink", July 1999, Terahertz and Gigahertz Photonics, Vol. 3795, pages 259-270.
	BE	Joseph C. Tramontana, "Semiconductor Laser Body Heat Sink", Xerox Disclosure Journal, Vol. 10, No. 6, November/December 1985, pages 379-381.
	BF	Sarah Arulanandam et al., "Liquid transport in rectangular microchannels by electroosmotic pumping", Colloid and Surfaces A: Physicochemical and Engineering Aspects 161 (2000), pages 89-102.
	BG	Jeffery D. Barner et al., "Thermal Ink Jet Print Head Carriage with Integral Liquid Cooling Capabilities", Xerox Disclosure Journal-Vol. 21, No. 1, January/February 1996, pages 33-34.
	BH	"Autonomous displacement of a solution in a microchannel by another solution", Research Disclosure, June 2001, pages 1046-1047.
	BI	John M. Waldvogel, "Aluminum Silicon Carbide Phase Change Heat Spreader", Motorola, June 1999, Technical Developments, pages 226-230.
	BJ	James P. Slupe et al., "An idea for maintaining a stable thermal environment for electronic devices", Research Disclosure, August 2001, page 1312.
	BK	John M. Waldvogel, "A Heat Transfer Enhancement Method for Forced Convection Bonded-Fin Heatsinks", Motorola, December 1997, Technical Developments, pages 158-159.
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	BM	R. C. Chu et al., "Process for Nucleate Boiling Enhancement", IBM Technical Disclosure Bulletin, Vol. 18, No. 7, December 1975, page 2227.
	BN	J. Riseman, "Structure for Cooling by Nucleate Boiling", IBM Technical Disclosure Bulletin, Vol. 18, No. 11, April 1976, page 3700.
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	BQ	"Heat Exchanger Modules for Data Process with Valves Operated by Pressure from Cooling Water Pump", IBM Technical Disclosure Bulletin, Vol. 30, No. 5, October 1987, page 419.
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	BV	"Chip Cooling Device", IBM Technical Disclosure Bulletin, Vol. 30, No. 9, February 1988, pages 435-436.
	BW	W. E. Ahearn et al., "Silicon Heat Sink Method to Control Integrated Circuit Chip Operating Temperatures", IBM Technical Disclosure Bulletin, Vol. 21, No. 8, January 1979, pages 3378-3380.
	BX	N. P. Bailey et al., "Cooling Device for Controlled Rectifier", IBM Technical Disclosure Bulletin, Vol. 21, No. 11, April 1979, pages 4609-4610.
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Examiner

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OTHER DOCUMENTS (Including Author, Title, Date, Relevant Pages, Place of Publication)				
	CE	R. C. Chu et al., "Silicon Heat Sink for Semiconductor Chip", IBM Technical Disclosure Bulletin, Vol. 24, No. 11A, April 1982, page 5743.		
	CF	J. M. Eldridge et al., "Heat-Pipe Vapor Cooling Etched Silicon Structure", IBM Technical Disclosure Bulletin, Vol. 25, No. 8, January 1983, pages 4118-4119.		
	CG	J. R. Skoborn, "Thermoelectrically Cooled Module", IBM Technical Disclosure Bulletin, Vol. 27, No. 1A, June 1984, page 30.		
	CH	M. J. Brady et al., "Etched Silicon Integrated Circuit Heat Sink", IBM Technical Disclosure Bulletin, Vol. 27, No. 1B, June 1984, page 627.		
	CI	H. D. Edmonds et al., "Heat Exchange Element for Semiconductor Device Cooling", IBM Technical Disclosure Bulletin, Vol. 23, No. 3, August 1980, page 1057.		
	CJ	R. W. Noth, "Heat Transfer from Silicon Chips and Wafers", IBM Technical Disclosure Bulletin, Vol. 17, No. 12, May 1975, page 3544.		
	CK	"Forced Boiling Cooling System with Jet Enhancement for Critical Heat Flux Extension", IBM Technical Disclosure Bulletin, Vol. 39, No. 10, October 1996, page 143.		
	CL	"Miniature Heat Exchanger for Corrosive Media", IBM Technical Disclosure Bulletin, Vol. 38, No. 01, January 1995, pages 55-56.		
	CM	"Self-Contained Active Heat Dissipation Device", IBM Technical Disclosure Bulletin Vol. 39, No. 04, April 1996, pages 115-116.		
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	CO	B. J. Ronkese, "Centerless Ceramic Package with Directly Connected Heat Sink", IBM Technical Disclosure Bulletin, Vol. 20, No. 9, February 1978, page 3577-3578.		
	CP	K. S. Sachar, "Liquid Jet Cooling of Integrated Circuit Chips", Vol. 20, No. 9, February 1978, pages 3727-3728.		
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	CS	R. D. Durand et al., "Flexible Thermal Conductor for Electronic Module", IBM Technical Disclosure Bulletin, Vol. 20, No. 11A, April 1978, page 4343.		
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DH	"Thermal Control Hardware for Accelerated Run-In Testing of Multi-Chip Modules", IBM Technical Disclosure Bulletin, Vol. 32, No. 5A, October 1989, page 129-130.			
DI	"Means of Removing More Heat From a TCM (Or Other Liquid-Cooled Logic Package) By Reducing the Coolant Temperature", IBM Technical Disclosure Bulletin, Vol. 32 No. 5A, Oct 1989, pages 153-154.			
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DW	M. B. Bowers et al., <u>Two-Phase Electronic Cooling Using Mini-Channel and Micro-Channel Heat Sinks: Part 2-Flow Rate and Pressure Drop Constraints</u> , December 1994, Journal of Electronic Packaging 116, pages 298-305.			
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	EH	George M. Harpole et al., <u>MICRO-CHANNEL HEAT EXCHANGER OPTIMIZATION</u> , 1991, Seventh IEEE SEMI-THERM Symposium, pages 59-63.			
	EI	Pei-Xue Jiang et al., <u>Thermal-hydraulic performance of small scale micro-channel and porous-media heat-exchangers</u> , 2001, International Journal of Heat and Mass Transfer 44 (2001), pages 1039-1051.			
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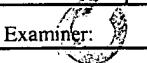
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GL	Gokturk Tunc et al., <u>Heat transfer in rectangular microchannels</u> , 2002, Int. J. Heat Mass Transfer, 45 (2002), pages 765-773.			
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